ADHD: Assessment and Diagnosis

Brett Nelson, MD

Medical Director, Child and Adolescent Psychiatry Clinic

Four Winds Saratoga

Medical Director Project TEACH Region 2

Speaker:

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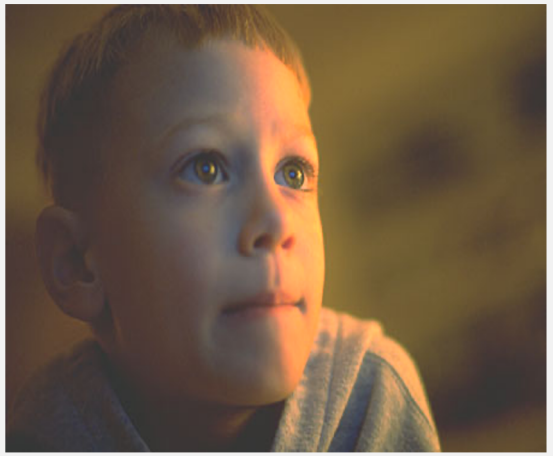
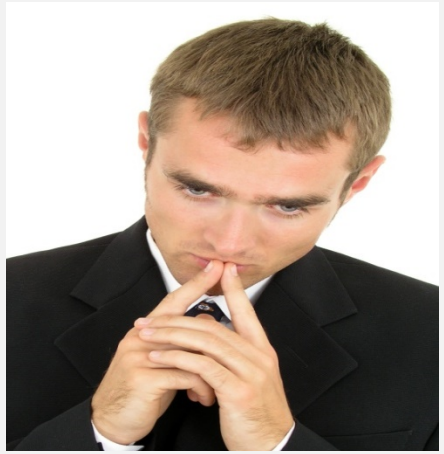
Disclosures

Neither I nor my spouse/partner have a relevant financial relationship with a commercial interest to disclose.

The Many Faces of ADHD





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Epidemiology

Epidemiology

- Most common presenting neurobehavioral disorder in children and adolescents
- Prevalence
  - 8- to 15-year-olds: 6 - 9%
  - 18- to 44-year-olds: 4 - 5%
- Boys nearly twice as likely to be diagnosed with ADHD
- Girls twice as likely as boys to have inattentive presentation
- Research in adults with ADHD has indicated that both genders have similar phenotypic features following adolescence

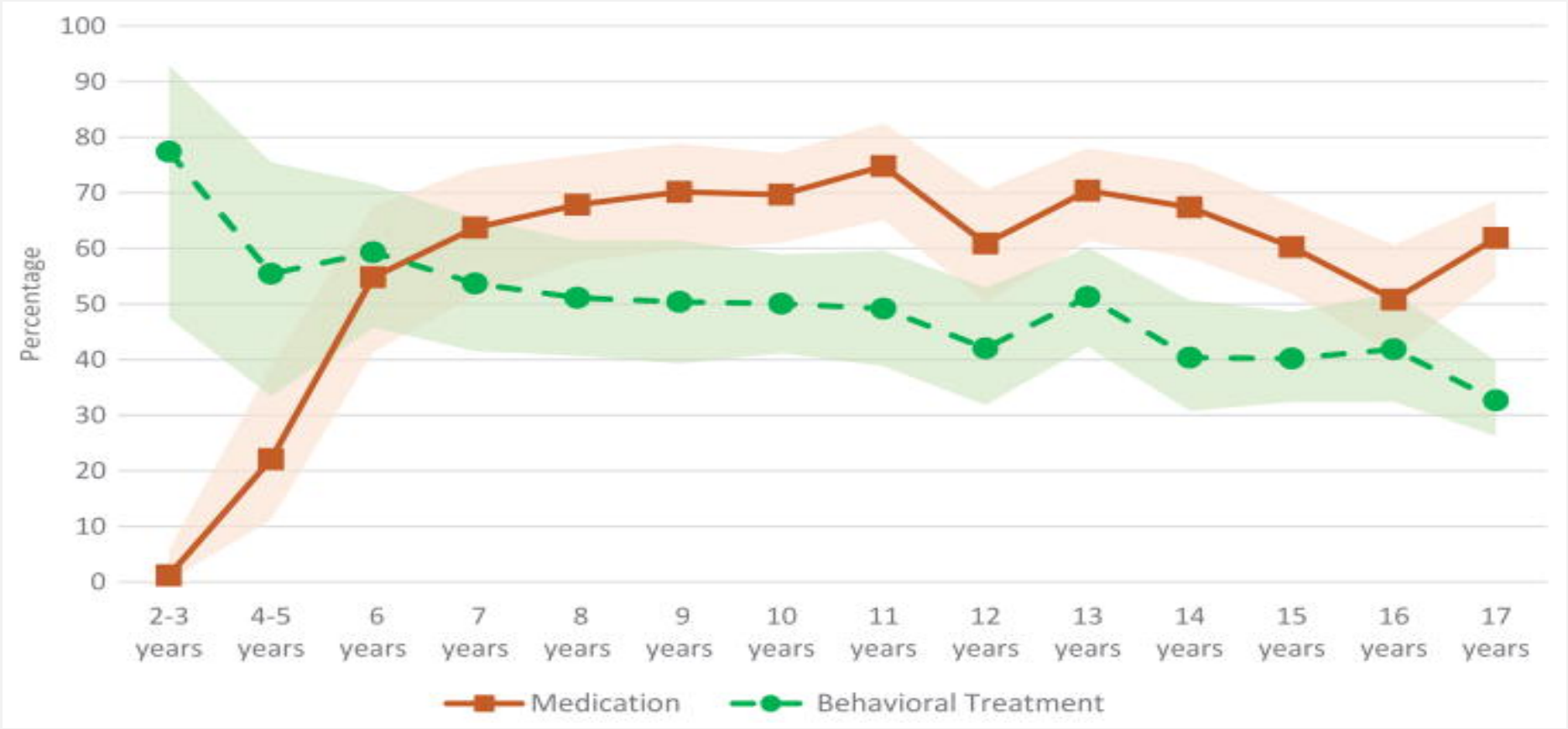
https://adhd-institute.com/burden-of-adhd/epidemiology/gender **Adler, Spencer, Wilens ADHD in Children and Adults, Cambridge Press 2016;**

Epidemiology

- **National Survey of Children's Health 2016**
- 6.1 million (9.4%) of U.S. children 2-17 years of age had ever received an ADHD diagnosis.
- 5.4 million (8.4%) were currently diagnosed with ADHD
- 3.3 million children (62%) of active diagnosis group were treated w/ medications
- 2.5 million children (46.7%) had received behavioral treatment
- Boys diagnosed more than girls (12.9% to 5.6%).

Danielson ML, Bitsko RH, Ghandour RM, Holbrook JR, Kogan MD, Blumberg SJ. Prevalence of parent-reported ADHD diagnosis and associated treatment among U.S. children and adolescents, 2016. Journal of Clinical Child and Adolescent Psychology. 2018, 47:2, 199-212.

Epidemiology



ETIOLOGY

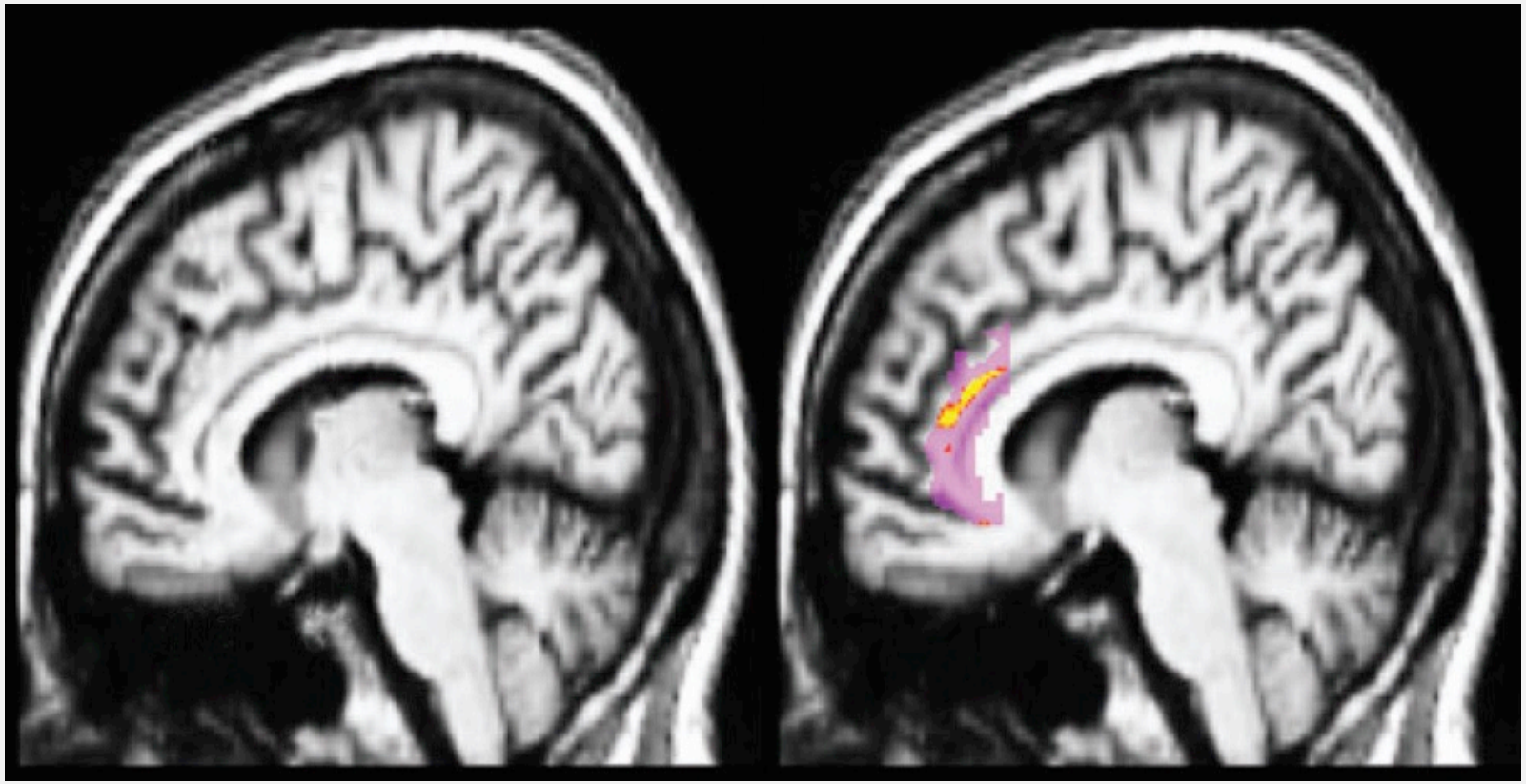
ETIOLOGY

- Smaller cerebrum, cerebellum and cerebral lobe volume
  - Anterior Cingulate Cortex and DL Prefrontal Cortex
- Developmental pattern of cortical maturation in ADHD
  - Delay in cortical thickness development
- Attenuated activity in frontostriatal regions of the brain for inhibitory control for attention (PFC and caudate)
  - Dopaminergic and noradrenergic dysregulation abnormalities
- DA/NE Medication may normalize functional deficits
  - Increase in activation of the ACC and DLPFC

Wilens TE, Spencer TJ. Understanding attention-deficit/hyperactivity disorder from childhood to adulthood. *Postgrad Med*. 2010;122(5):97-109. doi:10.3810/pgm.2010.09.2206

Zametkin. *J Am Acad Child Adolesc Psychiatry.* 1987;26(5):676-686.

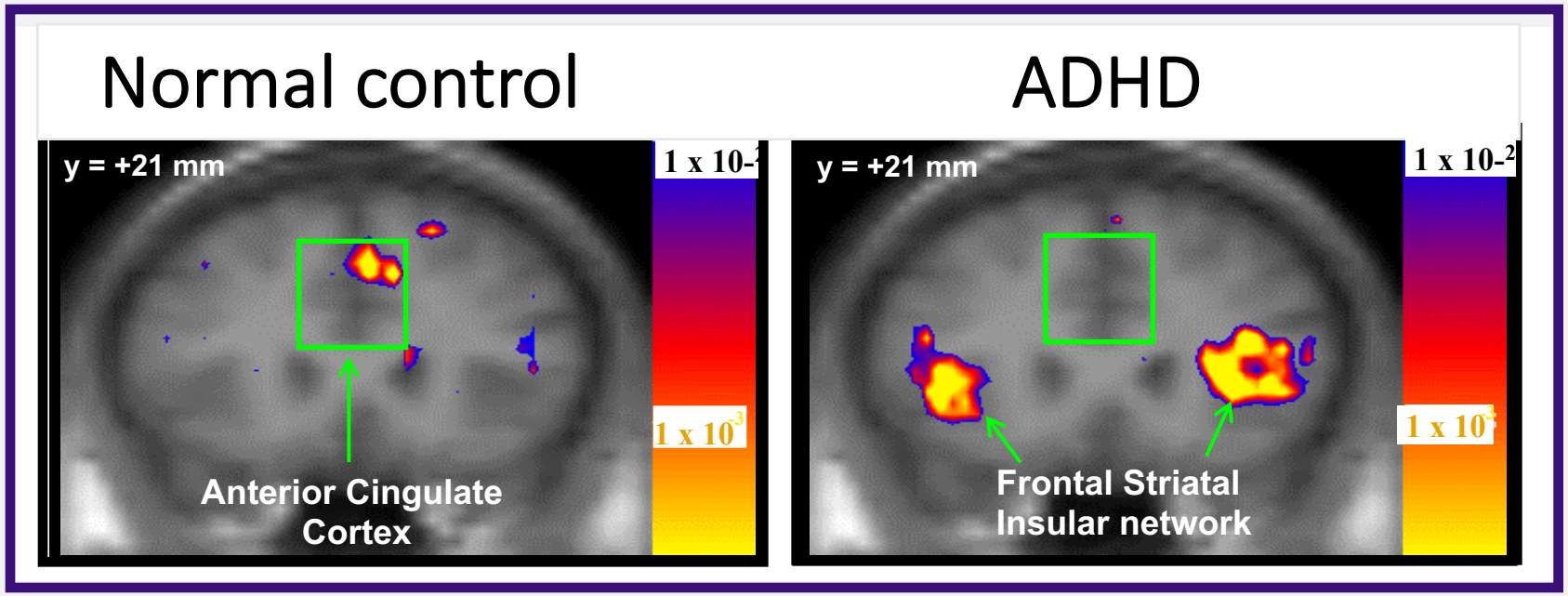
DTI-MRI Study in ADHD



Decrease in neuronal activity in the cingulate bundle compared with healthy controls.

Slide Courtesy of Dr. Janet Wozniak.

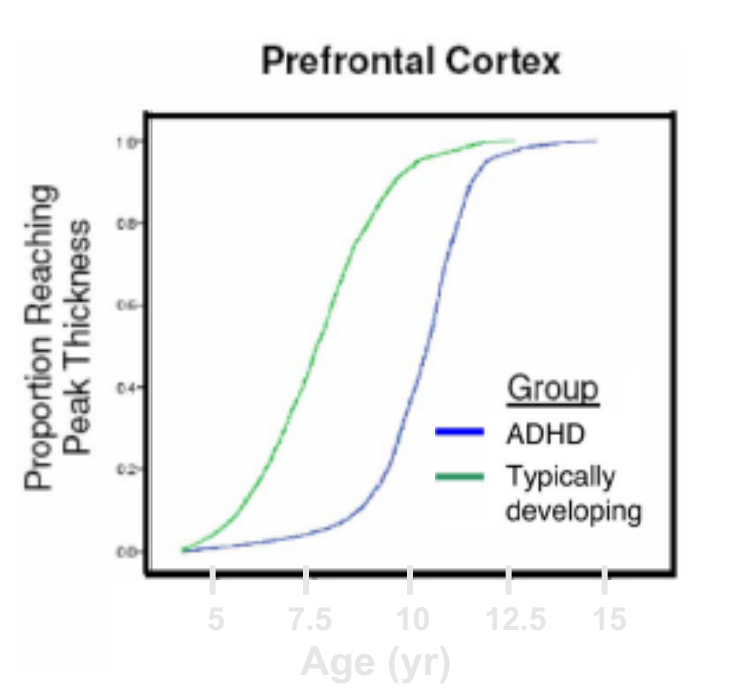
Makris et al. *Cerebral Cortex* 2008 May;18(5):1210-20



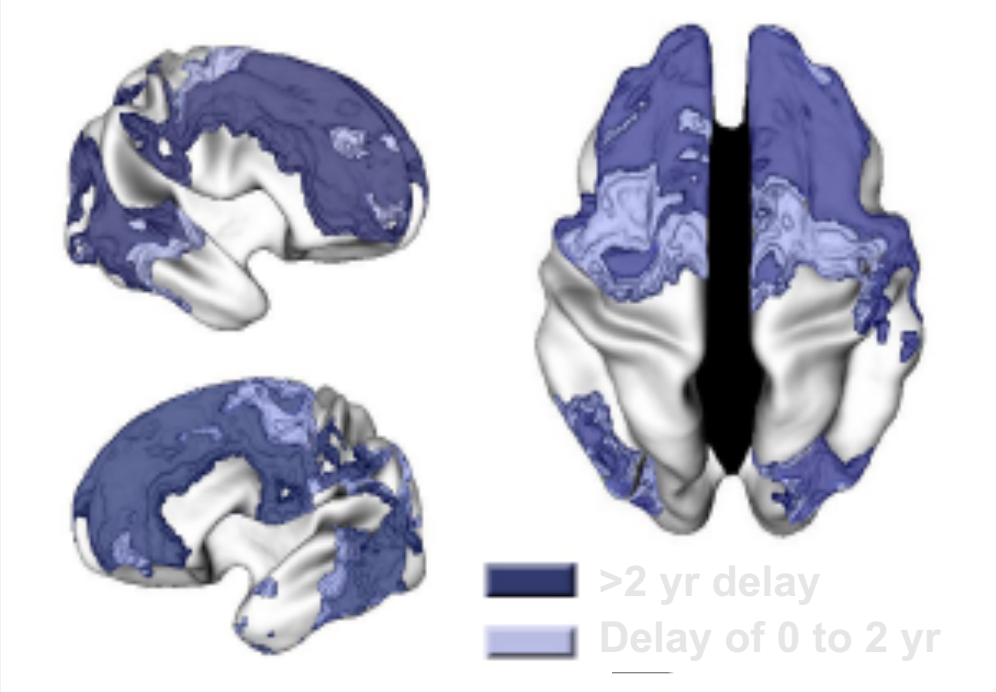
- fMRI shows decreased blood flow to the anterior cingulate and increased flow in the frontal striatum
- PET imaging shows decreased cerebral metabolism in brain areas controlling attention

MGH-NMR Center & Harvard-MIT CITP. Adapted from Bush, et al. *Biol Psychiatry.* 1999;45:1542-1552.

Delayed Cortical Maturation in ADHD



Kaplan-Meier curve showing fraction of cortical points that had reached peak thickness at each age



Regions where the ADHD group had delayed cortical maturation

Based on 824 magnetic resonance scans of 223 children with ADHD and 223 controls; longitudinal data; mean interval between scans 2.8 years

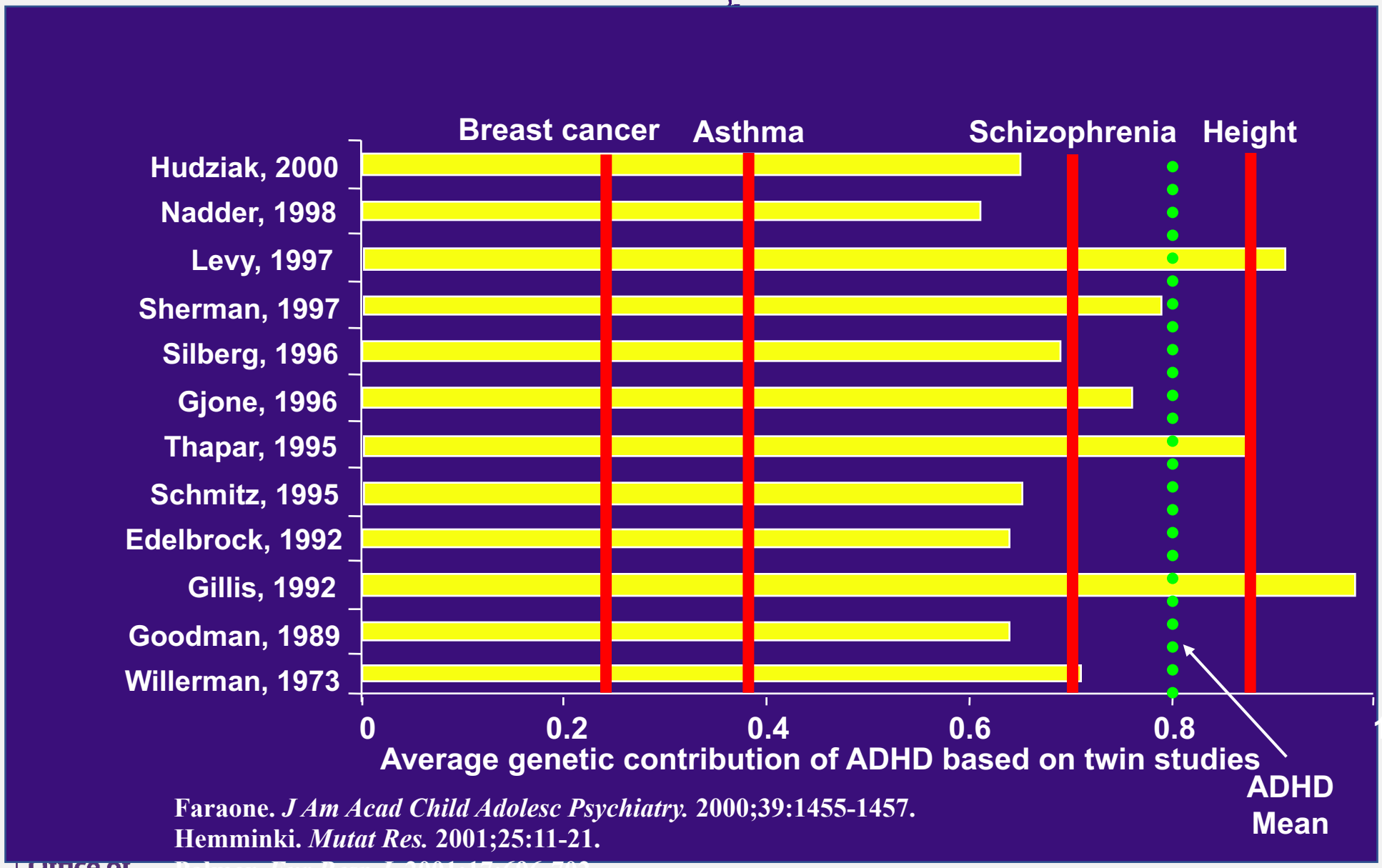
Shaw et al. *Proc Natl Acad Sci U S A*. 2007;104:19649-19654.

ADHD Imaging Studies Summary

- Neuroimaging studies confirm that brain abnormalities in fronto-subcortical networks are associated with ADHD
- Neuroimaging techniques are not valid tools for ADHD diagnosis; imaging measures are not sensitive or specific enough to be used for diagnostic purposes
- Treatment attenuate neural deficits

Slide Courtesy of Dr. Janet Wozniak.

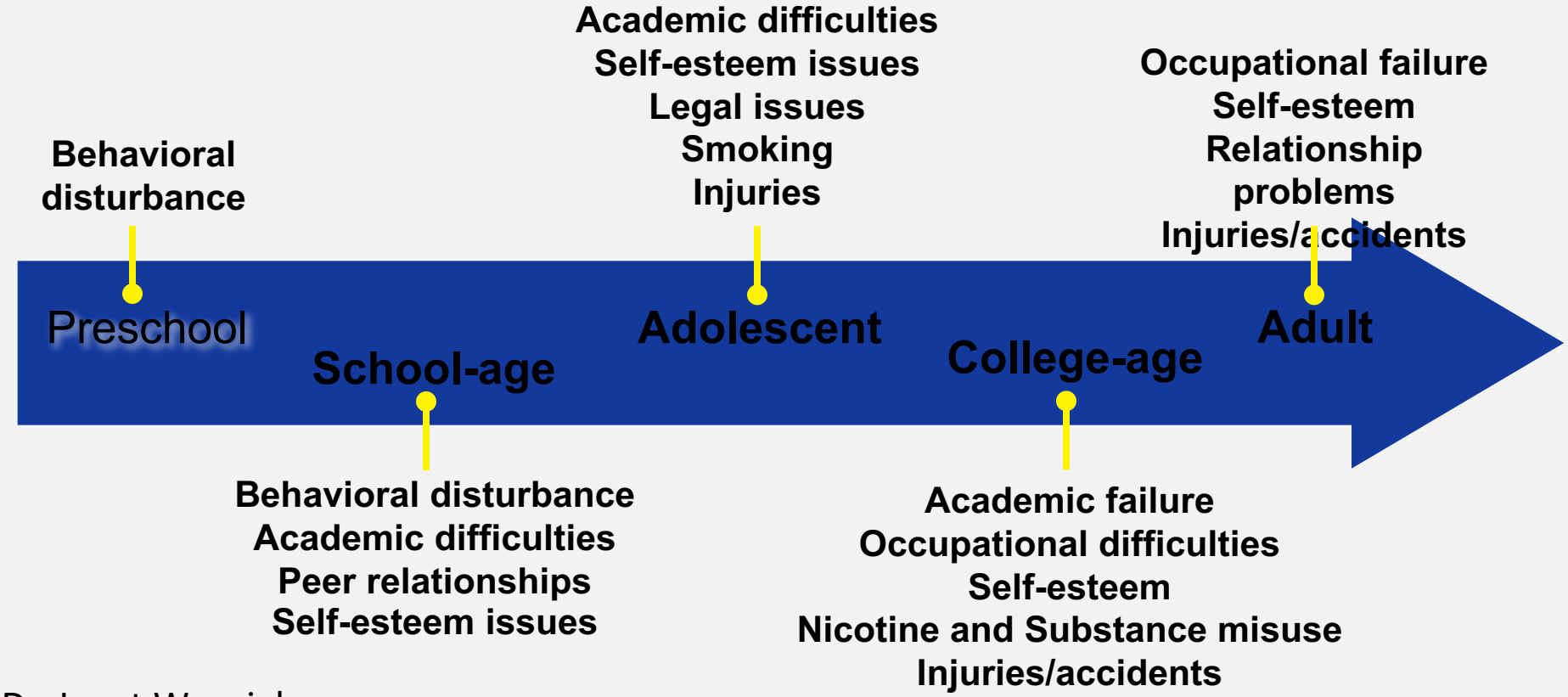
Spencer et al. *J Clin Psychiatry* 2013 Sep;74(9):902-17.



Faraone. *J Am Acad Child Adolesc Psychiatry.* 2000;39:1455-1457.
Hemminki. *Mutat Res.* 2001;25:11-21.
Palmer. *Eur Resp J.* 2001;17:696-702.

Course of ADHD

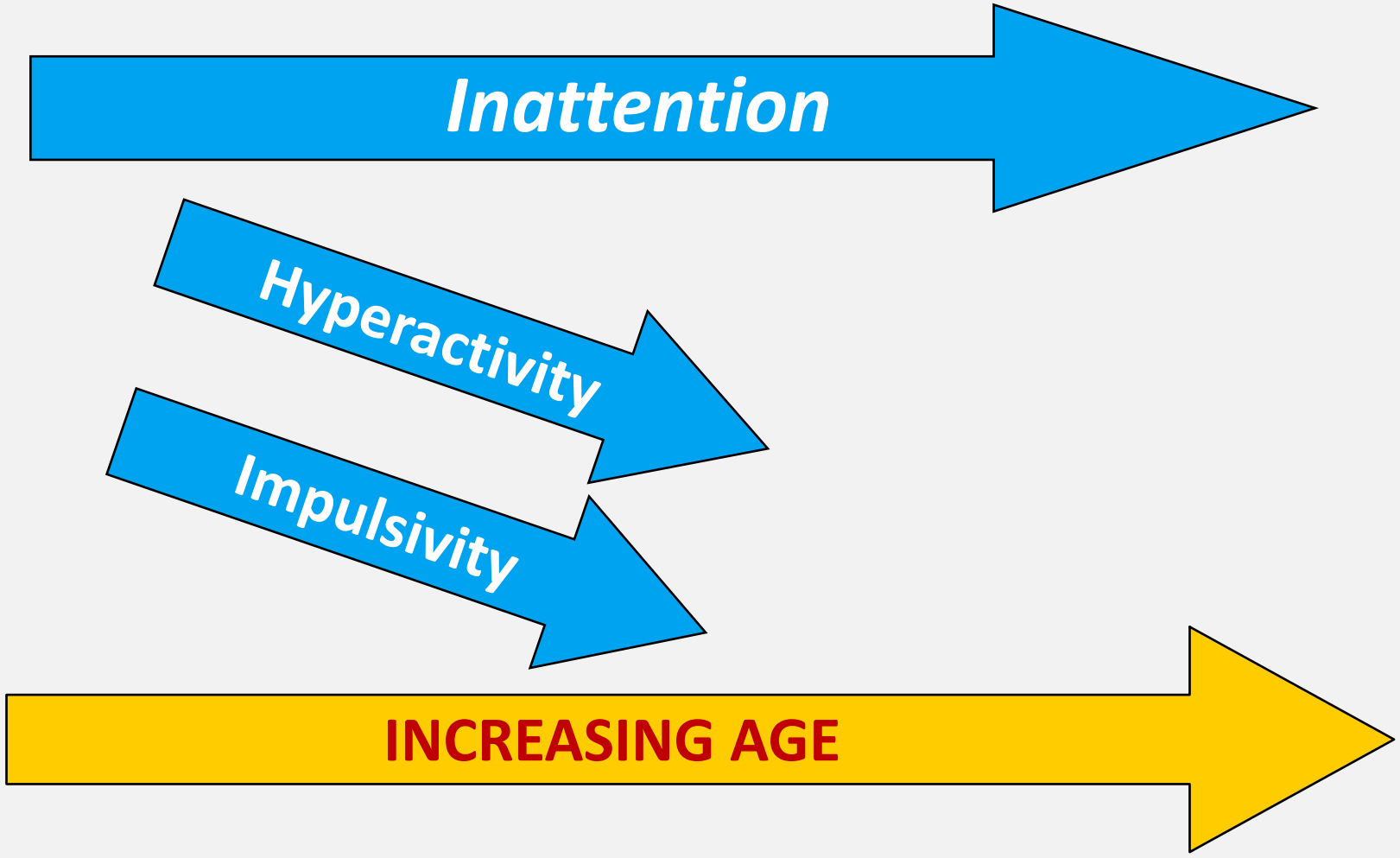
Developmental Impact of ADHD



Slide Courtesy of Dr. Janet Wozniak.

Pliszka S; AACAP Work Group on Quality Issues. *J Am Acad Child Adolesc Psychiatry*. 2007;46(7):894-921s; Adler, Spencer, Wilens ADHD in Children and Adults, Cambridge Press 2016)

Course of ADHD



Age-Dependent Decline and Persistence of ADHD Throughout the Lifetime

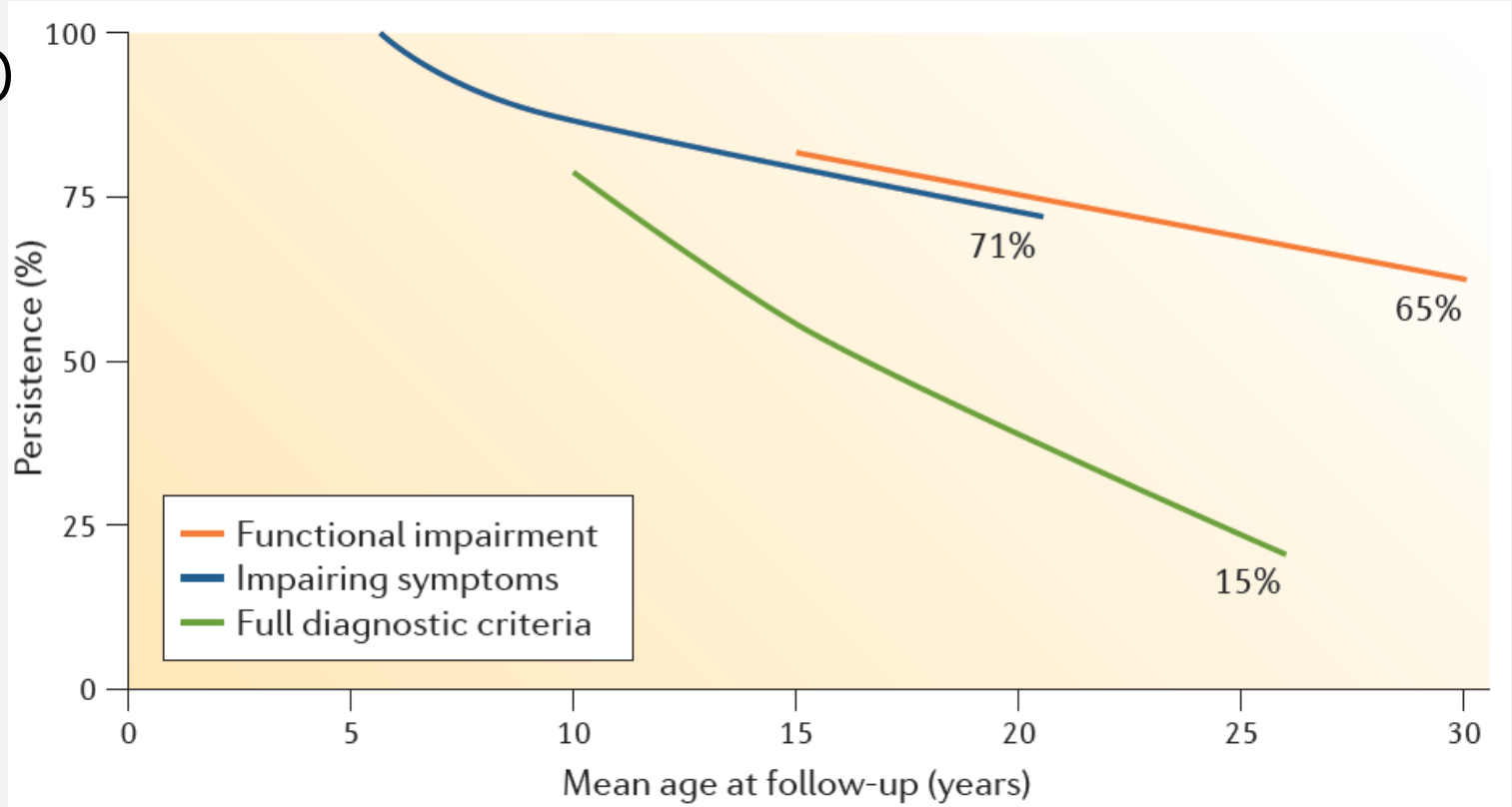


Figure 2 | **The age-dependent decline and persistence of attention-deficit/hyperactivity disorder throughout the lifetime.** Follow-up studies have assessed children with attention-deficit/hyperactivity disorder (ADHD) at multiple time points after their initial diagnosis. Although they document an age-dependent decline in ADHD symptoms, ADHD is also a highly persistent disorder when defined by the persistence of functional impairment[7] or the persistence of subthreshold (three or fewer) impairing symptoms[8]. By contrast, many patients remit full diagnostic criteria[7].

Slide Courtesy of Dr. Janet Wozniak

Faraone et al. *Nature Reviews Disease Primers* 2015

Course of ADHD

- WHO survery 2-3% prevalence worldwide
- 75% of children continue to have ADHD into adolescence
- ~50% of adolescents continue to have ADHD into adulthood

Fayyad J, Sampson NA, Hwang I, et al. The descriptive epidemiology of DSM-IV Adult ADHD in the World Health Organization World Mental Health Surveys. *Atten Defic Hyperact Disord*. 2017;9(1):47-65. doi:10.1007/s12402-016-0208-3

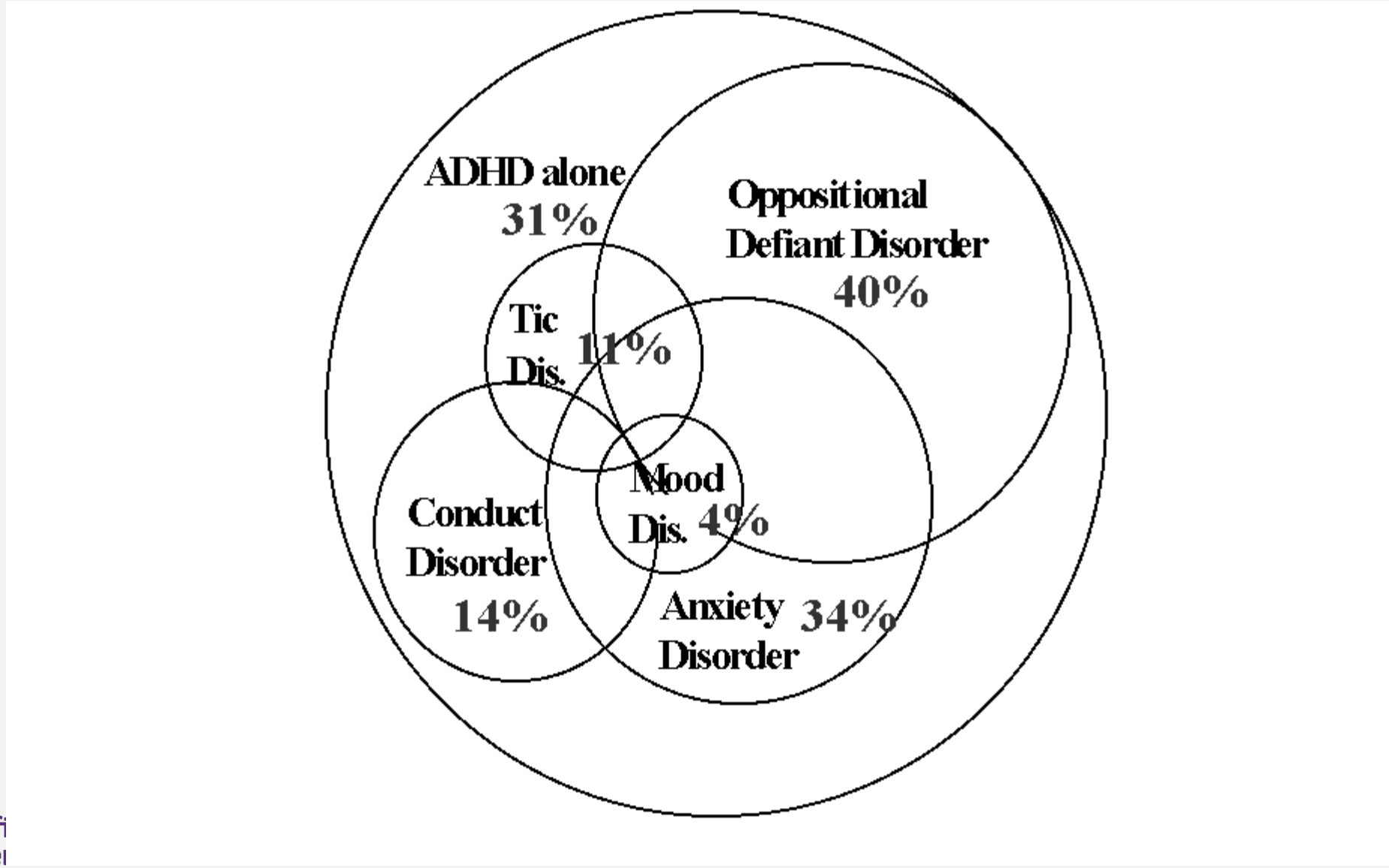
COMORBID CONDITIONS

COMORBID CONDITIONS

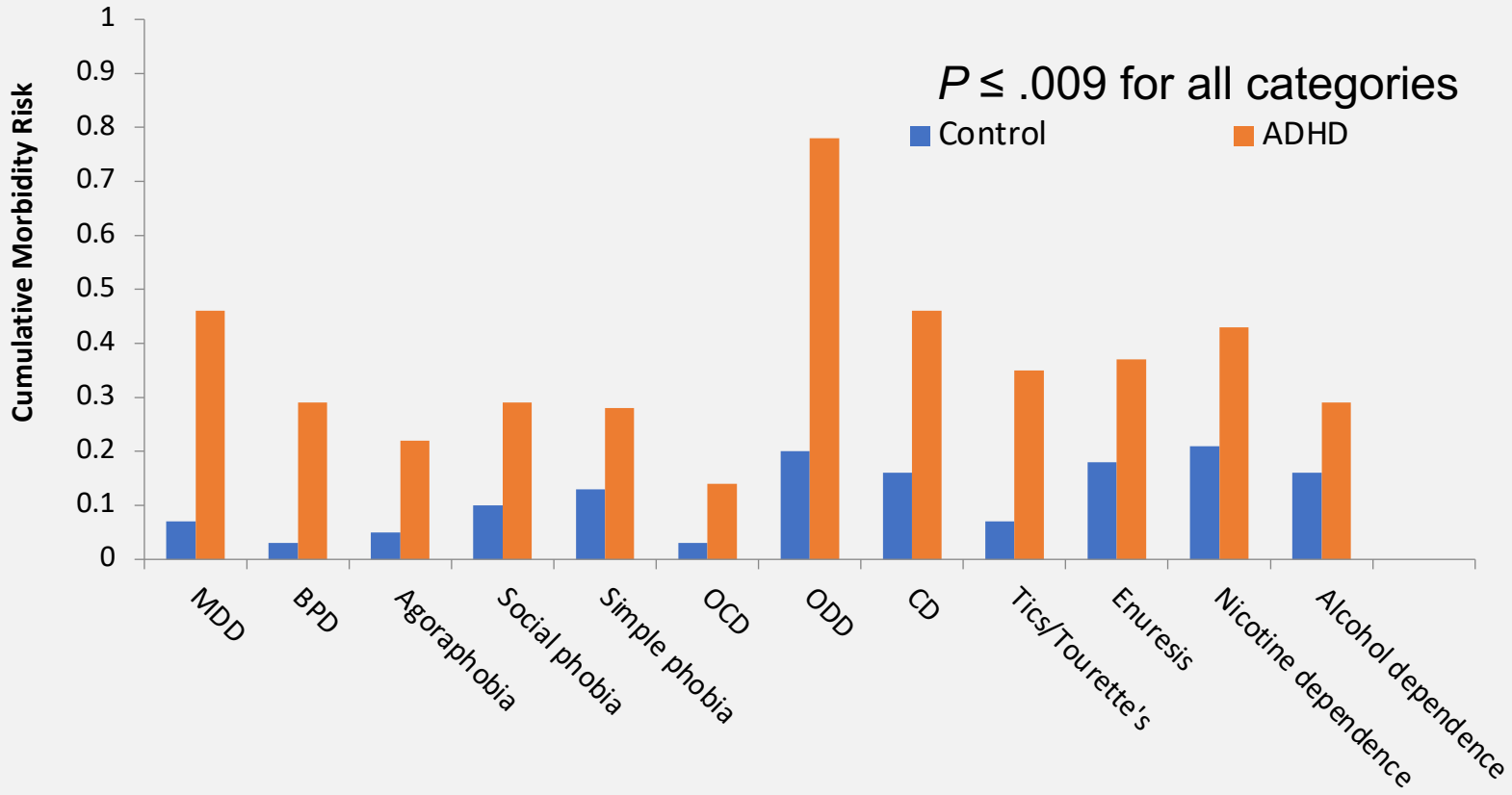
- Oppositional defiant disorder
- Conduct disorder
- Anxiety Disorders
  - Separation anxiety disorder
  - Generalized anxiety disorder
  - Social phobia
- Learning disorders
- Language Disordera
- Tic disorders
- Depression
- Bipolar disorder
- Substance Use Disorder

Greenhill L, et al. *J Am Acad Child Adolesc Psychiatry* 2002;41(2 Suppl):26S–49S.
Spencer T, et al. *Ped Clin N Am* 1999;6:915–927.

COMORBID CONDITIONS



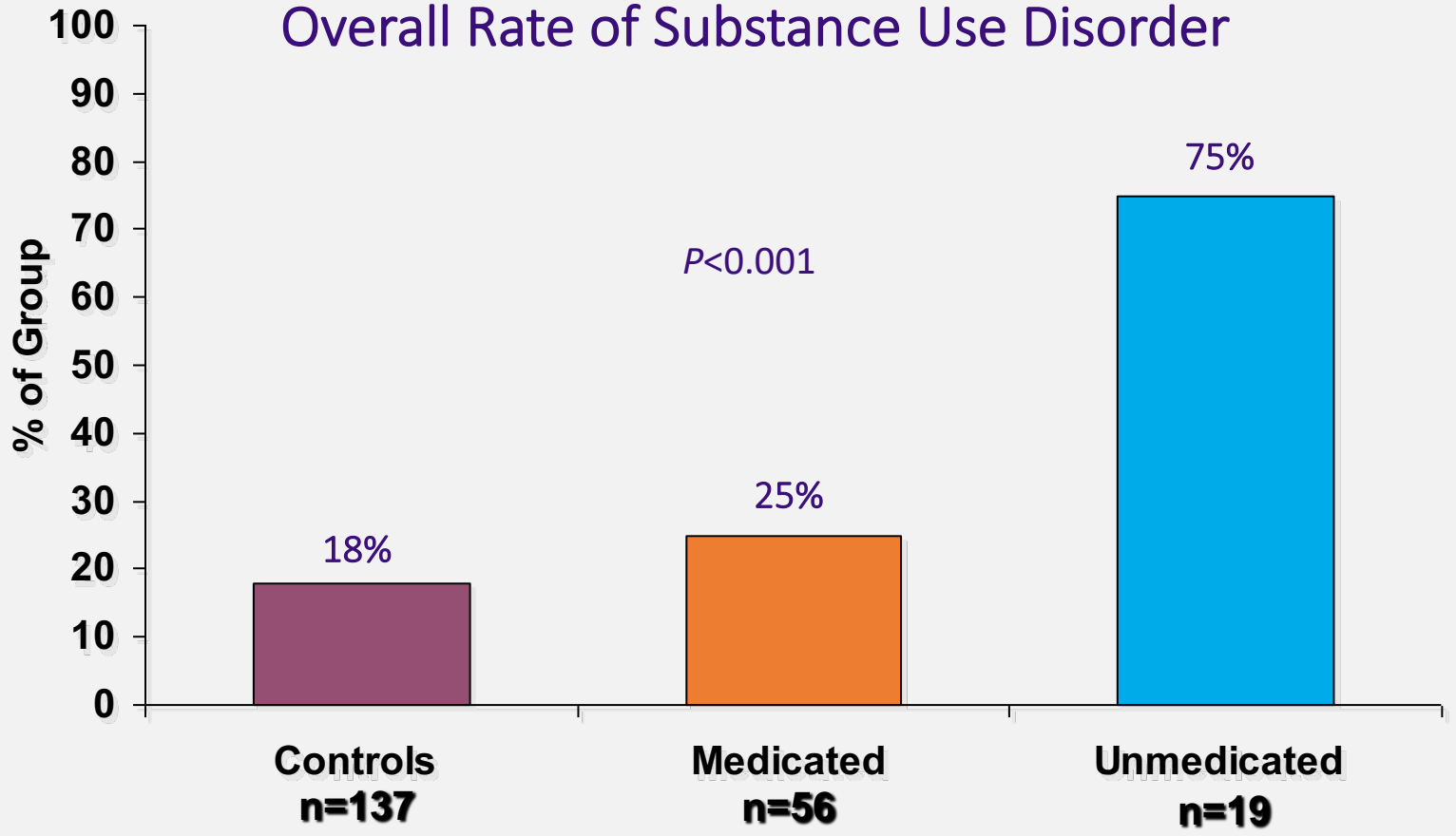
Cumulative Morbidity Risks for Psychiatric Disorders in ADHD and Control Probands



Slide Courtesy of Dr. Janet Wozniak.

Biederman et al. *Psychological Medicine*, 2006, 36, 167–179.

Substance Use Disorders and ADHD



Biederman J, et al. *Pediatrics.* 1999;104:e20.

Diagnosis of ADHD

Diagnosis of ADHD

- Changes in DSM-5 (2013)
  - Re-classified as “Neurodevelopmental” disorder
  - Symptom onset by age 12 (no longer 7)
  - Autism is no longer exclusionary
  - “Presentations” rather than “Subtypes”
  - Adults diagnosed need 5 symptoms (not six)

Diagnosis of ADHD

- DSM-5 Criteria
  - Persistent **inattention and/or hyperactivity, impulsivity**
  - **6 months** duration that are inconsistent for the developmental level
  - Onset of symptoms before **age 12**
  - **2 or more settings** (school, work, home)
  - Evidence of clinically **significant impairment** in social, academic, or occupational functioning

Diagnosis of ADHD

- **Clinical assessment** of subjective symptoms
- No gold standard test available
- Psychological evaluation not required
- Rating Scales
  - **Vanderbilt** (parent, teacher forms – PT website)
  - SNAP
  - Connors
  - ASRS

NICHQ Vanderbilt Assessment Scale—PARENT Informant

Today's Date: _____ Child's Name: _____ Date of Birth: _____

Parent's Name: _____ Parent's Phone Number: _____

Directions: **Each rating should be considered in the context of what is appropriate for the age of your child. When completing this form, please think about your child's behaviors in the past 6 months.**

Is this evaluation based on a time when the child ☐ **was on medication** ☐ **was not on medication** ☐ **not sure?**

Symptoms	Never	Occasionally	Often	Very Often
1. Does not pay attention to details or makes careless mistakes with, for example, homework	0	1	2	3
2. Has difficulty keeping attention to what needs to be done	0	1	2	3
3. Does not seem to listen when spoken to directly	0	1	2	3
4. Does not follow through when given directions and fails to finish activities (not due to refusal or failure to understand)	0	1	2	3
5. Has difficulty organizing tasks and activities	0	1	2	3
6. Avoids, dislikes, or does not want to start tasks that require ongoing mental effort	0	1	2	3
7. Loses things necessary for tasks or activities (toys, assignments, pencils, or books)	0	1	2	3
8. Is easily distracted by noises or other stimuli	0	1	2	3
9. Is forgetful in daily activities	0	1	2	3
10. Fidgets with hands or feet or squirms in seat	0	1	2	3
11. Leaves seat when remaining seated is expected	0	1	2	3
12. Runs about or climbs too much when remaining seated is expected	0	1	2	3
13. Has difficulty playing or beginning quiet play activities	0	1	2	3
14. Is "on the go" or often acts as if "driven by a motor"	0	1	2	3
15. Talks too much	0	1	2	3
16. Blurts out answers before questions have been completed	0	1	2	3
17. Has difficulty waiting his or her turn	0	1	2	3
18. Interrupts or intrudes in on others' conversations and/or activities	0	1	2	3
19. Argues with adults	0	1	2	3
20. Loses temper	0	1	2	3
21. Actively defies or refuses to go along with adults' requests or rules	0	1	2	3
22. Deliberately annoys people	0	1	2	3
23. Blames others for his or her mistakes or misbehaviors	0	1	2	3
24. Is touchy or easily annoyed by others	0	1	2	3
25. Is angry or resentful	0	1	2	3
26. Is spiteful and wants to get even	0	1	2	3
27. Bullies, threatens, or intimidates others	0	1	2	3
28. Starts physical fights	0	1	2	3
29. Lies to get out of trouble or to avoid obligations (ie, "cons" others)	0	1	2	3
30. Is truant from school (skips school) without permission	0	1	2	3
31. Is physically cruel to people	0	1	2	3
32. Has stolen things that have value	0	1	2	3

Adapted from the Vanderbilt Rating Scales developed by Mark L. Wolraich, MD.

Revised - 1102

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NICHQ
National Initiative for Children's Healthcare Quality

McNeil
Consumer & Specialty Pharmaceuticals

NICHQ Vanderbilt Assessment Scale—PARENT Informant

Today's Date: _____ Child's Name: _____ Date of Birth: _____

Parent's Name: _____ Parent's Phone Number: _____

Symptoms (continued)	Never	Occasionally	Often	Very Often
33. Deliberately destroys others' property	0	1	2	3
34. Has used a weapon that can cause serious harm (bat, knife, brick, gun)	0	1	2	3
35. Is physically cruel to animals	0	1	2	3
36. Has deliberately set fires to cause damage	0	1	2	3
37. Has broken into someone else's home, business, or car	0	1	2	3
38. Has stayed out at night without permission	0	1	2	3
39. Has run away from home overnight	0	1	2	3
40. Has forced someone into sexual activity	0	1	2	3
41. Is fearful, anxious, or worried	0	1	2	3
42. Is afraid to try new things for fear of making mistakes	0	1	2	3
43. Feels worthless or inferior	0	1	2	3
44. Blames self for problems, feels guilty	0	1	2	3
45. Feels lonely, unwanted, or unloved; complains that "no one loves him or her"	0	1	2	3
46. Is sad, unhappy, or depressed	0	1	2	3
47. Is self-conscious or easily embarrassed	0	1	2	3

Performance	Excellent	Above Average	Average	Somewhat of a Problem	Problematic
48. Overall school performance	1	2	3	4	5
49. Reading	1	2	3	4	5
50. Writing	1	2	3	4	5
51. Mathematics	1	2	3	4	5
52. Relationship with parents	1	2	3	4	5
53. Relationship with siblings	1	2	3	4	5
54. Relationship with peers	1	2	3	4	5
55. Participation in organized activities (eg, teams)	1	2	3	4	5

Comments:

For Office Use Only

Total number of questions scored 2 or 3 in questions 1–9: _____

Total number of questions scored 2 or 3 in questions 10–18: _____

Total Symptom Score for questions 1–18: _____

Total number of questions scored 2 or 3 in questions 19–26: _____

Total number of questions scored 2 or 3 in questions 27–40: _____

Total number of questions scored 2 or 3 in questions 41–47: _____

Total number of questions scored 4 or 5 in questions 48–55: _____

Average Performance Score: _____

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SNAP-IV 26-Item Teacher and Parent Rating Scale

James M. Swanson, Ph.D., University of California, Irvine, CA 92715

Patient/Client Name: _____

Date of birth: _____ Gender: _____

Grade: _____ Type of class: _____ Class size: _____

Completed by: _____ Date: _____

Physician Name: _____

For each item, check the column which best describes this child/adolescent:

	Not at all	Just a little	Quite a bit	Very much
1. Often fails to give close attention to details or makes careless mistakes in schoolwork or tasks				
2. Often has difficulty sustaining attention in tasks or play activities				
3. Often does not seem to listen when spoken to directly				
4. Often does not follow through on instructions and fails to finish schoolwork, chores, or duties				
5. Often has difficulty organizing tasks and activities				
6. Often avoids, dislikes, or reluctantly engages in tasks requiring sustained mental effort				
7. Often loses things necessary for activities (e.g., toys, school assignments, pencils or books				
8. Often is distracted by extraneous stimuli				
9. Often is forgetful in daily activities				
10. Often fidgets with hands or feet or squirms in seat				
11. Often leaves seat in classroom or in other situations in which remaining seated is expected				
12. Often runs about or climbs excessively in situations in which it is inappropriate				
13. Often has difficulty playing or engaging in leisure activities quietly				
14. Often is "on the go" or often acts as if "driven by a motor"				
15. Often talks excessively				
16. Often blurts out answers before questions have been completed				
17. Often has difficulty awaiting turn				
18. Often interrupts or intrudes on others (e.g., butts into conversations/ games				
19. Often loses temper				
20. Often argues with adults				
21. Often actively defies or refuses adult requests or rules				
22. Often deliberately does things that annoy other people				
23. Often blames others for his or her mistakes or misbehaviour				
24. Often is touchy or easily annoyed by others				
25. Often is angry and resentful				
26. Often is spiteful or vindictive				

Adult ADHD Self-Report Scale (ASRS-v1.1) Symptom Checklist

Patient Name		Today's Date	

Please answer the questions below, rating yourself on each of the criteria shown using the scale on the right side of the page. As you answer each question, place an X in the box that best describes how you have felt and conducted yourself over the past 6 months. Please give this completed checklist to your healthcare professional to discuss during today's appointment.	Never	Rarely	Sometimes	Often	Very Often
1. How often do you have trouble wrapping up the final details of a project, once the challenging parts have been done?					
2. How often do you have difficulty getting things in order when you have to do a task that requires organization?					
3. How often do you have problems remembering appointments or obligations?					
4. When you have a task that requires a lot of thought, how often do you avoid or delay getting started?					
5. How often do you fidget or squirm with your hands or feet when you have to sit down for a long time?					
6. How often do you feel overly active and compelled to do things, like you were driven by a motor?					
					Part A
7. How often do you make careless mistakes when you have to work on a boring or difficult project?					
8. How often do you have difficulty keeping your attention when you are doing boring or repetitive work?					
9. How often do you have difficulty concentrating on what people say to you, even when they are speaking to you directly?					
10. How often do you misplace or have difficulty finding things at home or at work?					
11. How often are you distracted by activity or noise around you?					
12. How often do you leave your seat in meetings or other situations in which you are expected to remain seated?					
13. How often do you feel restless or fidgety?					
14. How often do you have difficulty unwinding and relaxing when you have time to yourself?					
15. How often do you find yourself talking too much when you are in social situations?					
16. When you're in a conversation, how often do you find yourself finishing the sentences of the people you are talking to, before they can finish them themselves?					
17. How often do you have difficulty waiting your turn in situations when turn taking is required?					
18. How often do you interrupt others when they are busy?					
					Part B

Diagnosis of ADHD

- Good clinical history
- DSM-5 as diagnostic tool
- Rating scales corroborate clinical diagnosis
- Information from multiple sources
  - Parents, teachers, therapist and patient
  - Determine functional impairment in home and school
- Labs, EKG, imaging as indicated
  - Rule out medical conditions
  - cardiac, seizures, lead poisoning, hyperthyroid, etc.
- Assess for coexisting psychiatric conditions

Thank you

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